

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

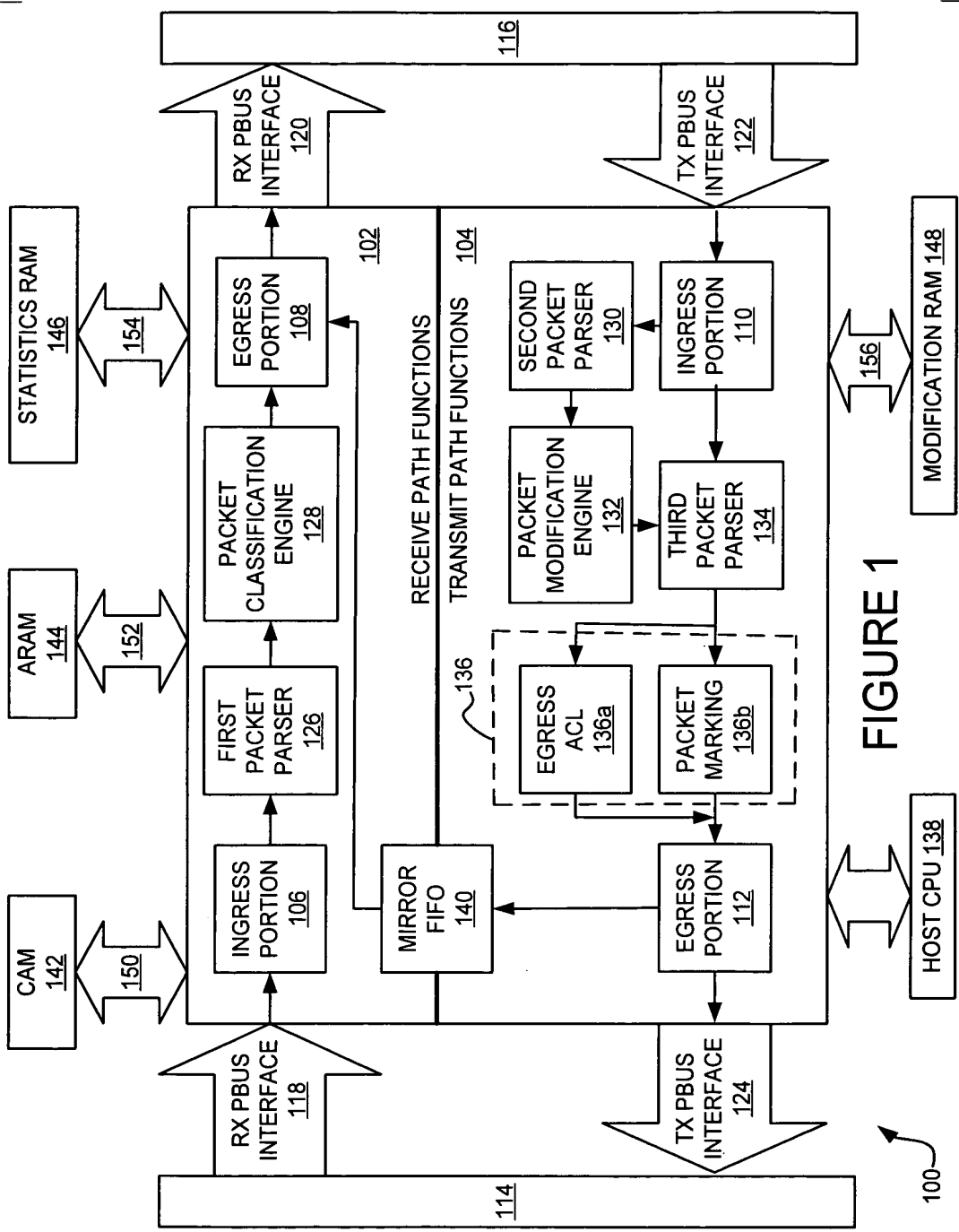


FIGURE 1

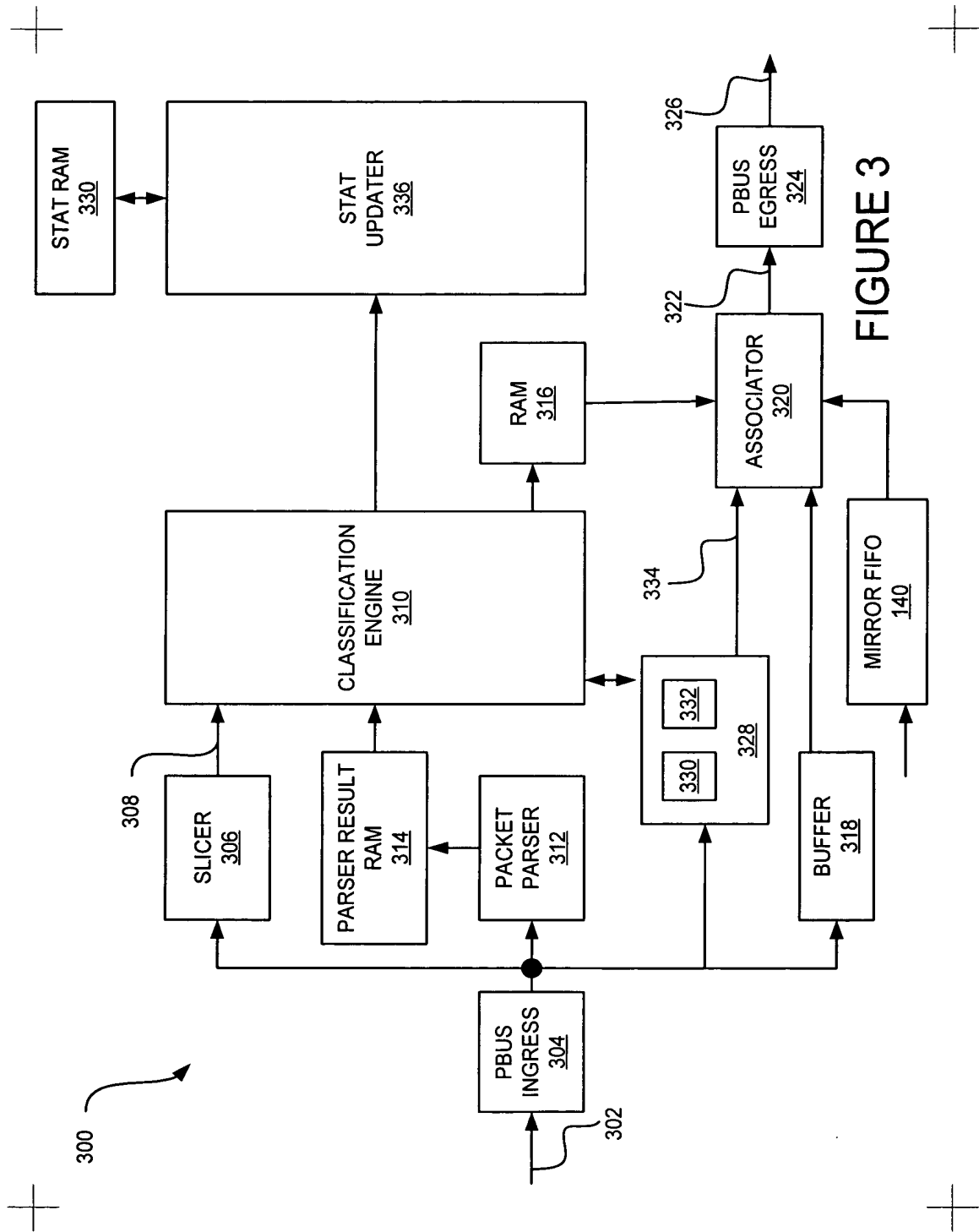
BIT	FUNCTION	DESCRIPTION
15-0	PTI	PORT TAG INDEX.
19-16	EQoS	EGRESS QUEUE SELECT.
23-20	LAI	LAI INDEX.
24	JUMBO	EGRESS JUMBO CHECK FLAG.
25	DON'T FRAG	DON'T FRAGMENT FLAG.
26	IF TYPE	INGRESS INTERFACE TYPE. 0 = ETHERNET, 1 = POS INTERFACE.
27	-	RESERVED.
28	ROUTE	ROUTE FLAG.
29	RED	RANDOM EARLY DROP.
31-30	CTL	AFH FORMAT TYPE.
51-32	TXMI	TRANSMIT MODIFICATION INDEX.
58-52	CQoS	CPU QUEUE SELECT.
59	CPU COPY	CPU COPY FLAG.
60	REDIRECT	REDIRECT FLAG.
61	SSAMPLE	STATISTICAL SAMPLE FLAG.
62	LEARN	LEARN FLAG. REQUESTS OT TO SEND A COPY OF THE PACKET TO THE CPU FOR LEARN PROCESSING.
63	EMIRROR	EGRESS MIRROR.
75-64	IQoS	INGRESS QUEUE SELECT.
78-76	EMRK SEL	EGRESS MARK SELECT.
81-79	EMRK MASK	EGRESS MARK MASK.
82	IMIRROR	INGRESS MIRROR.
83	PERR KILL	PARITY ERROR KILL.

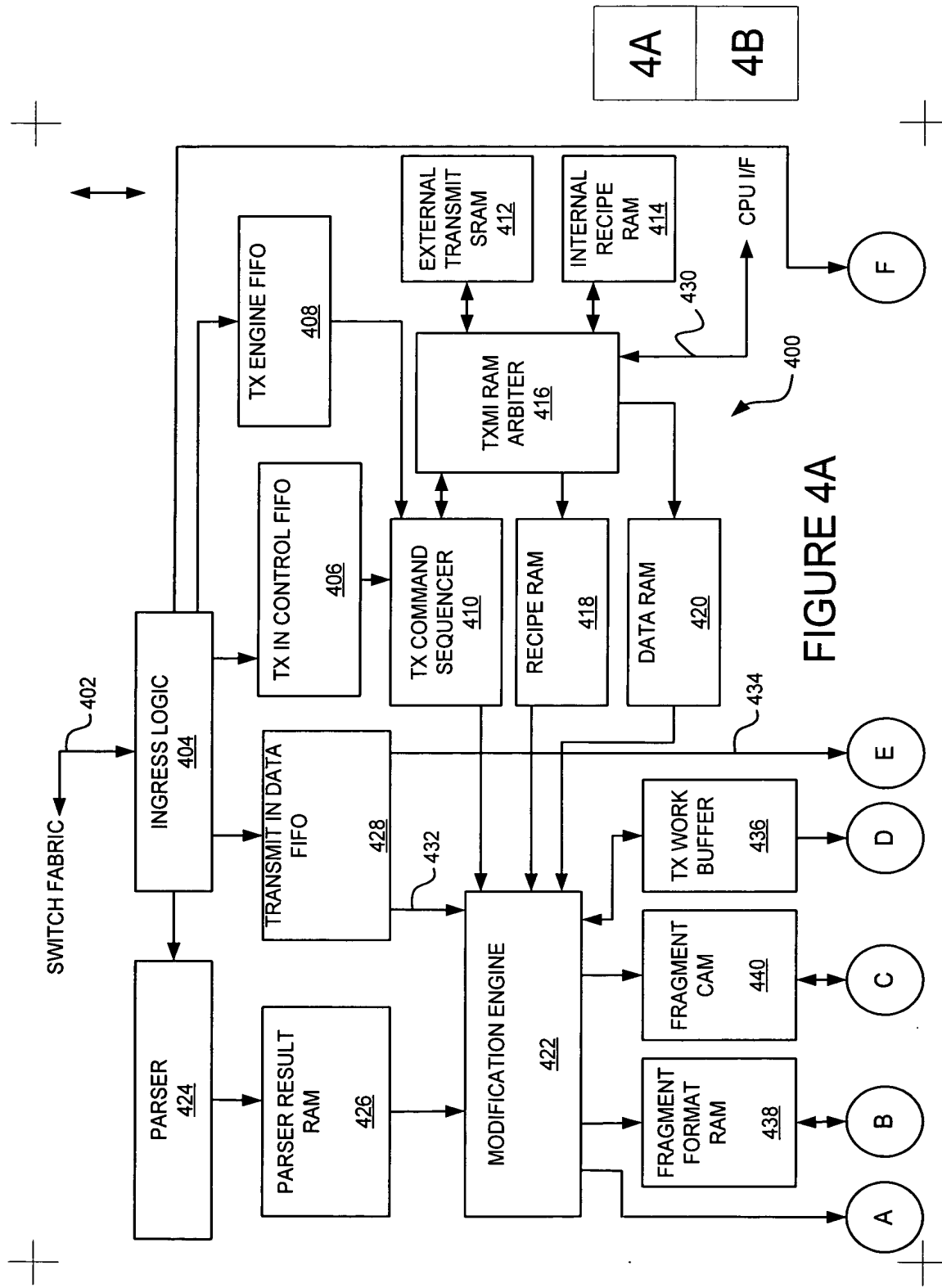
202

204

200

FIGURE 2





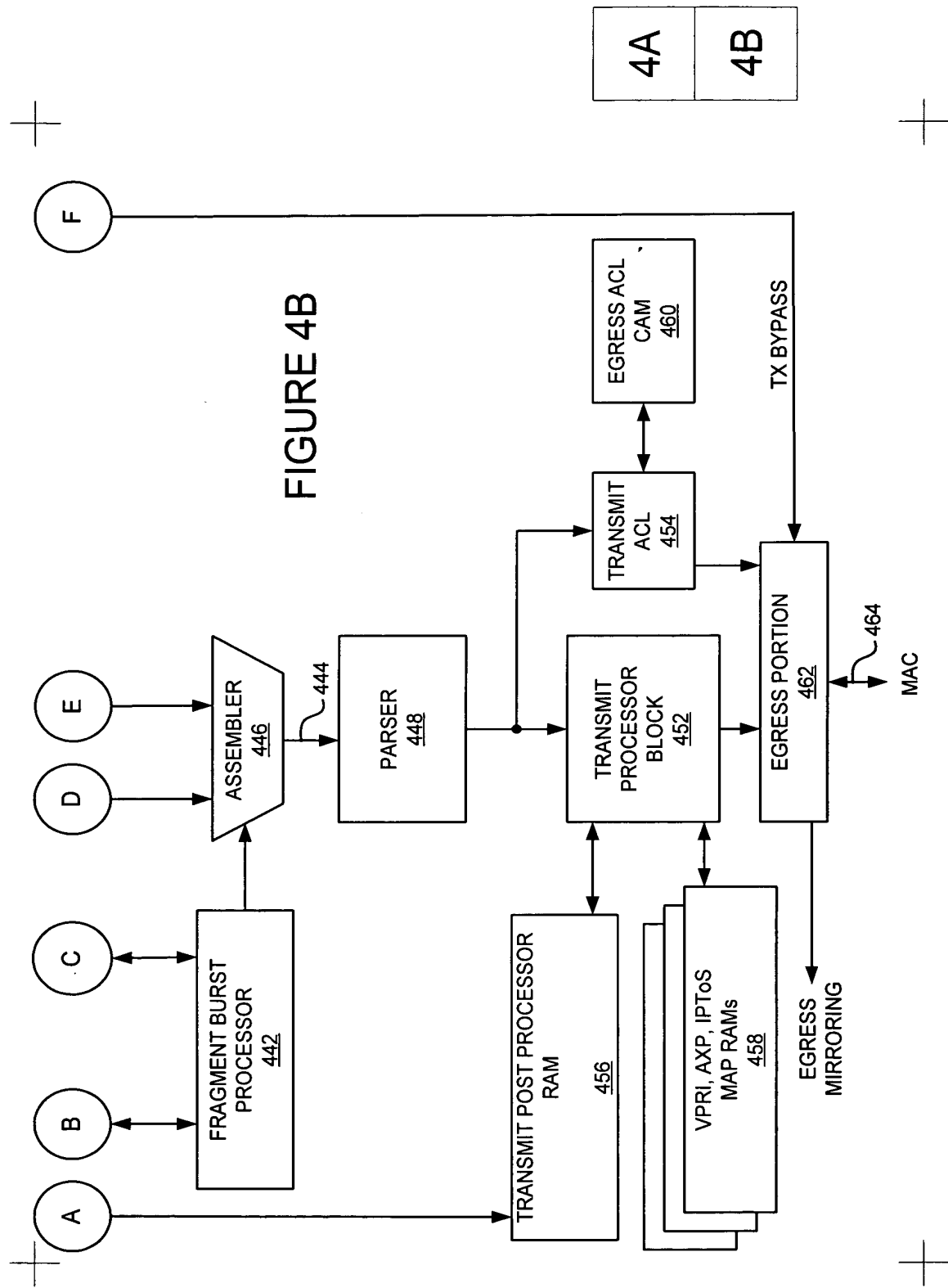


FIGURE 4B

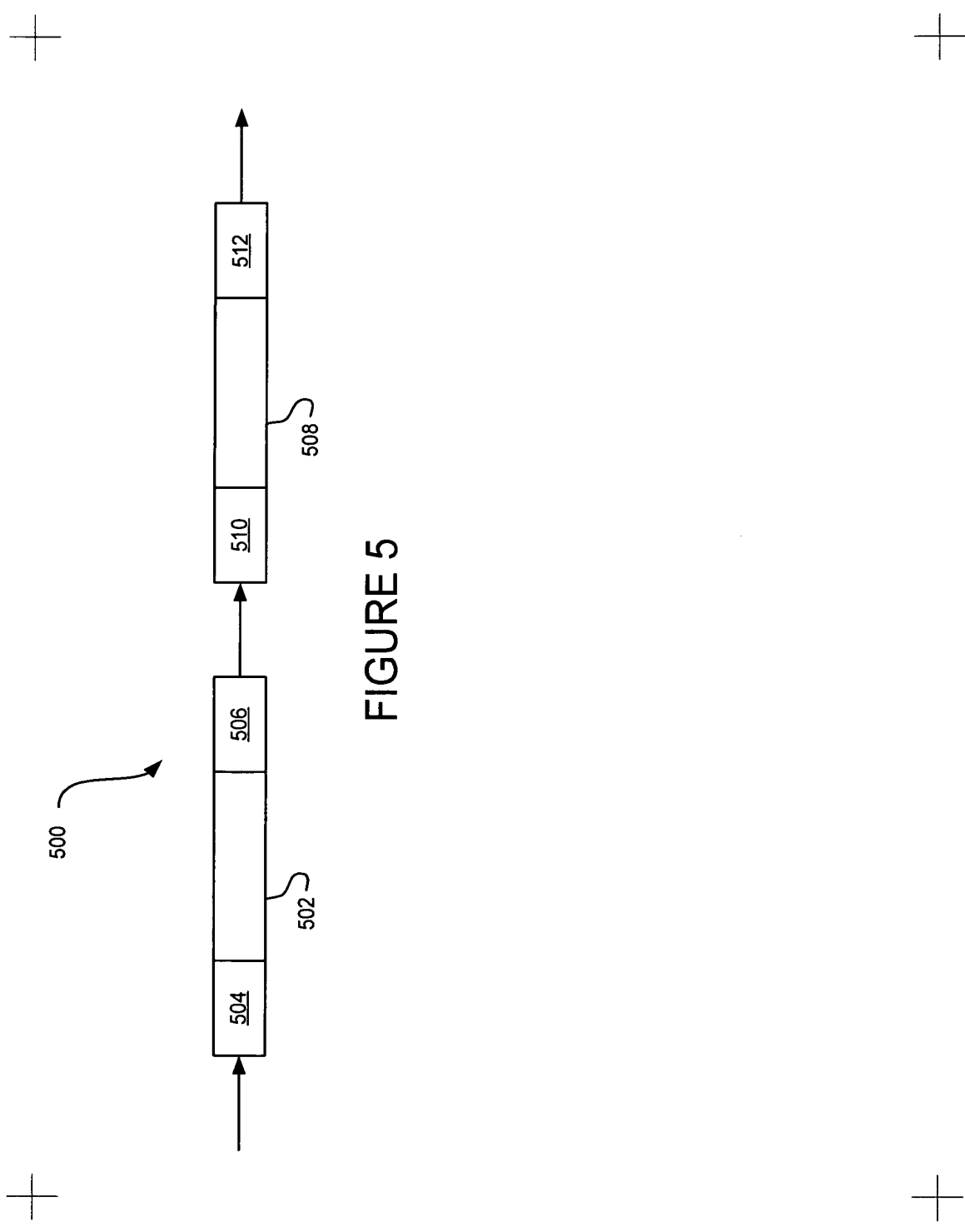


FIGURE 5

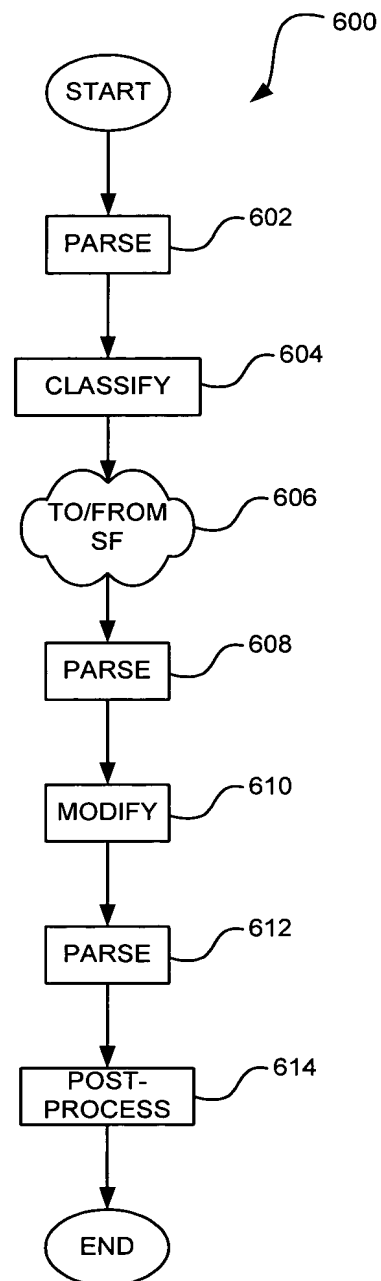


FIGURE 6

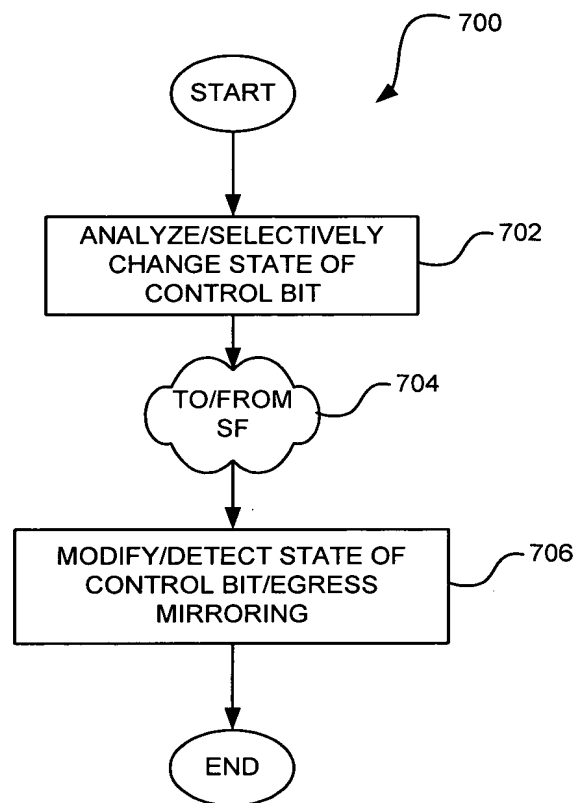


FIGURE 7

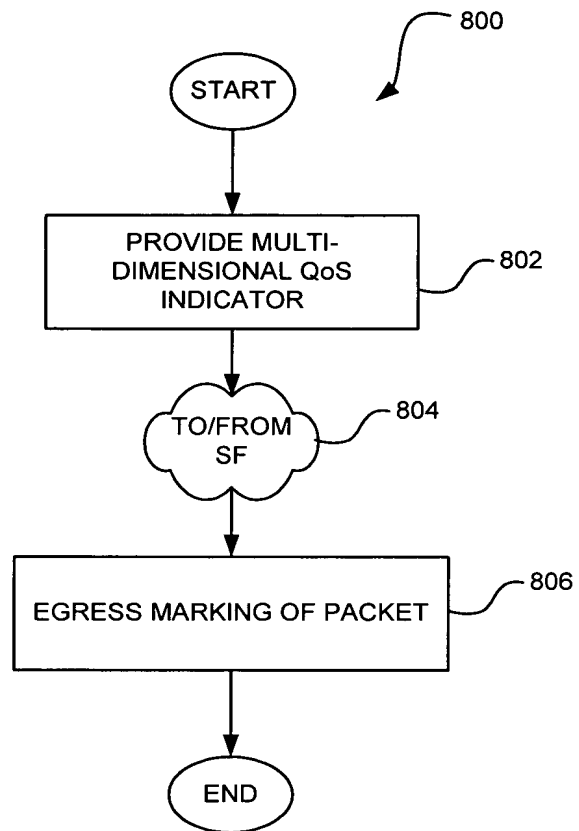


FIGURE 8

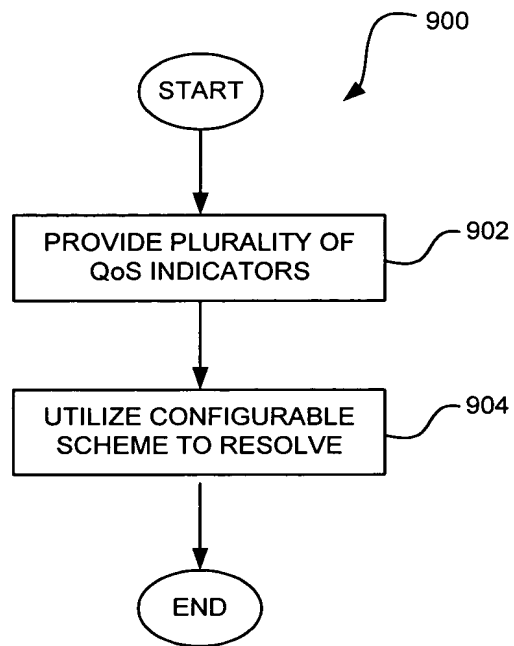


FIGURE 9

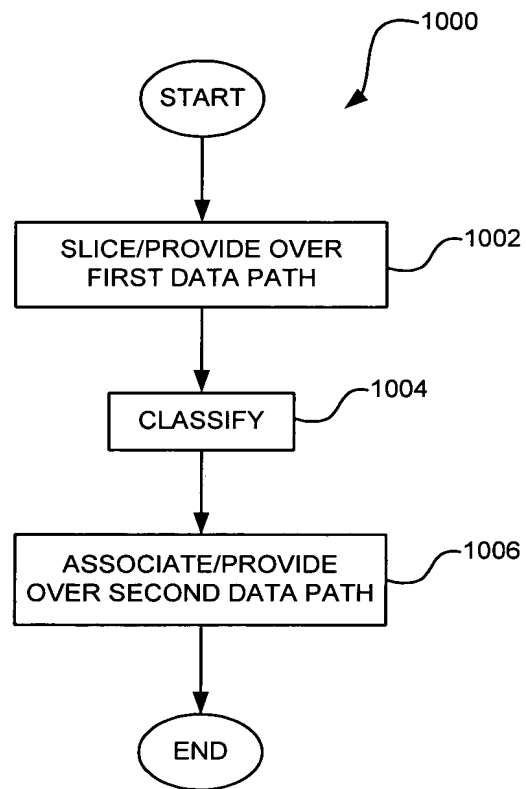


FIGURE 10

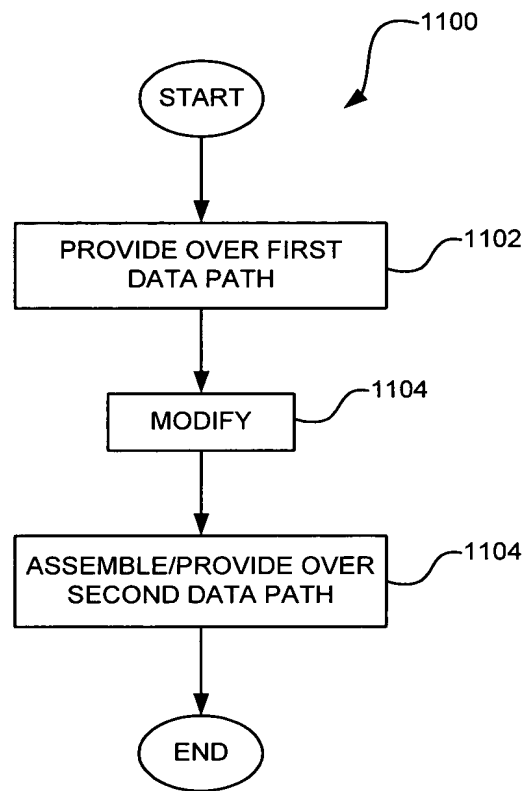


FIGURE 11

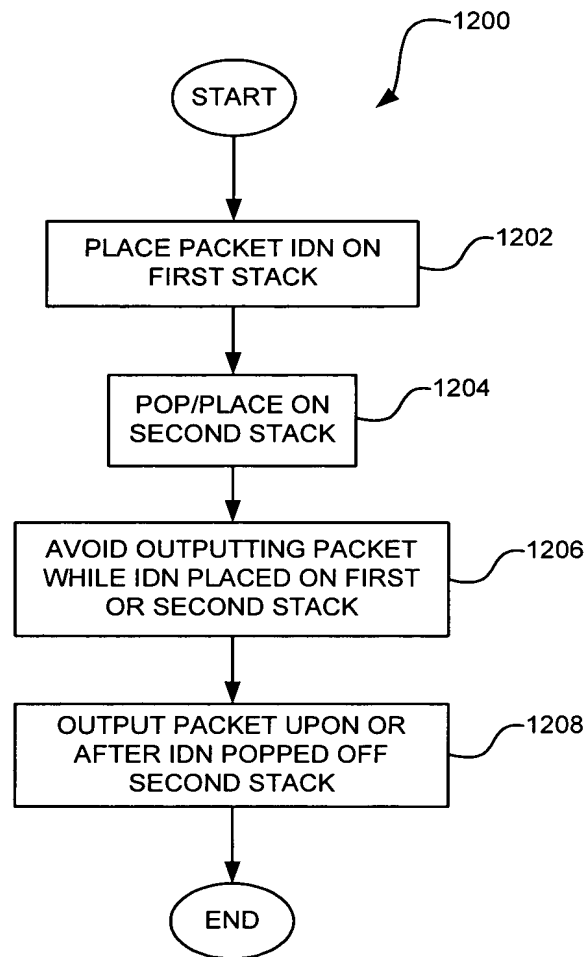


FIGURE 12

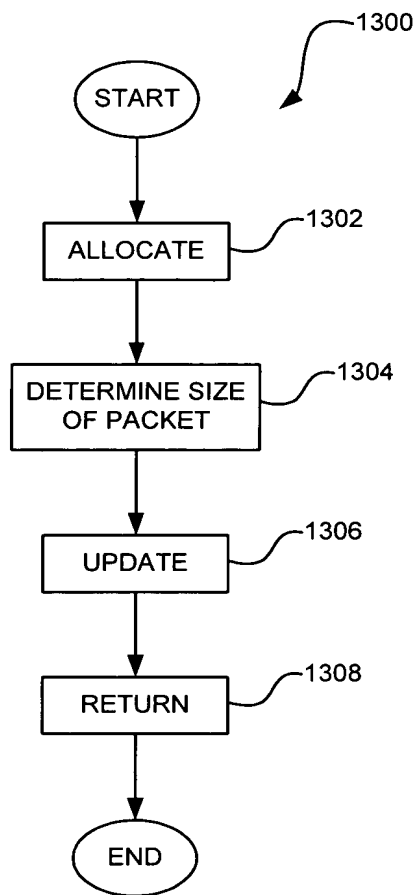


FIGURE 13

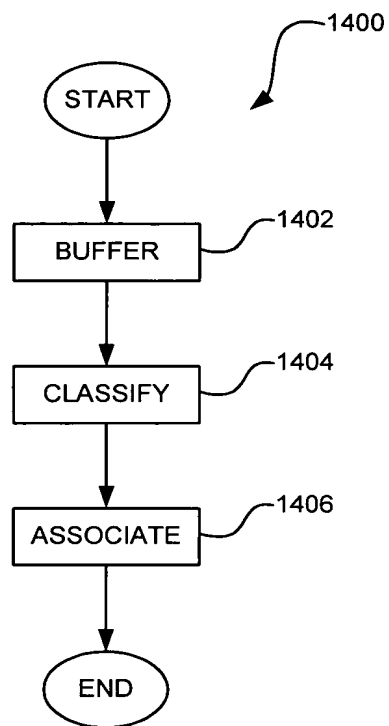


FIGURE 14

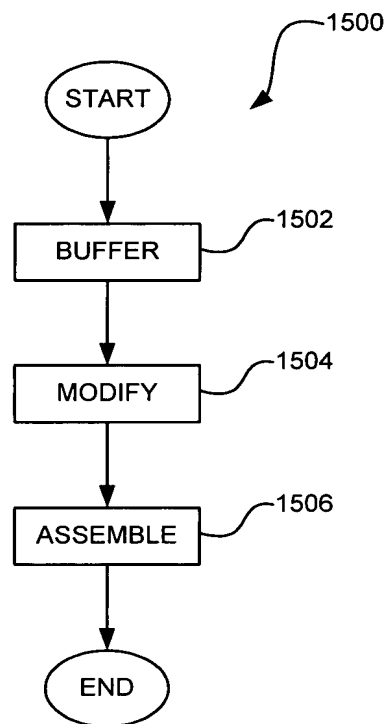


FIGURE 15

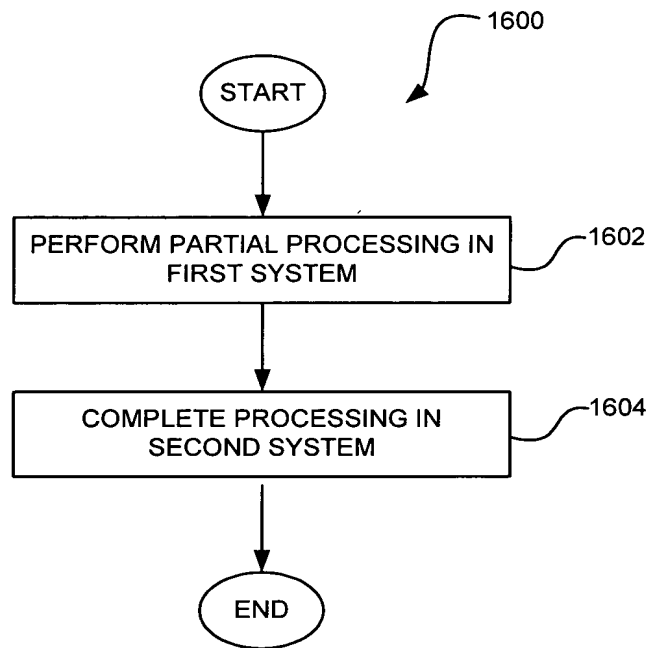


FIGURE 16

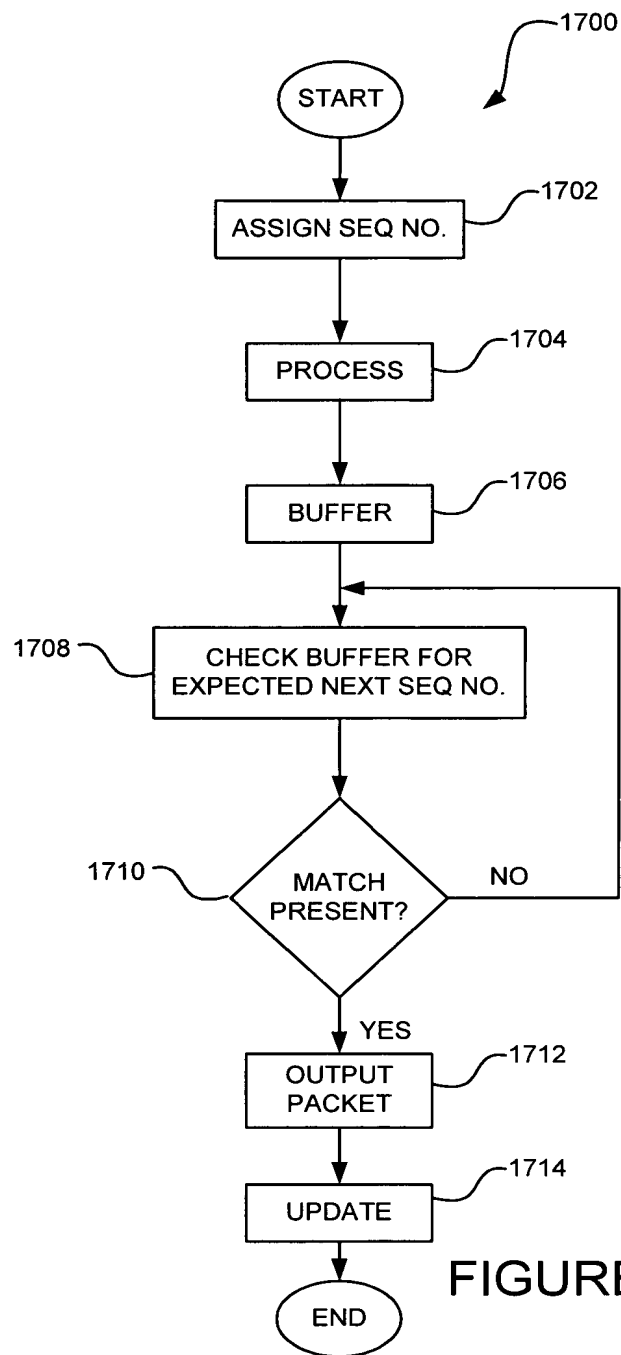


FIGURE 17

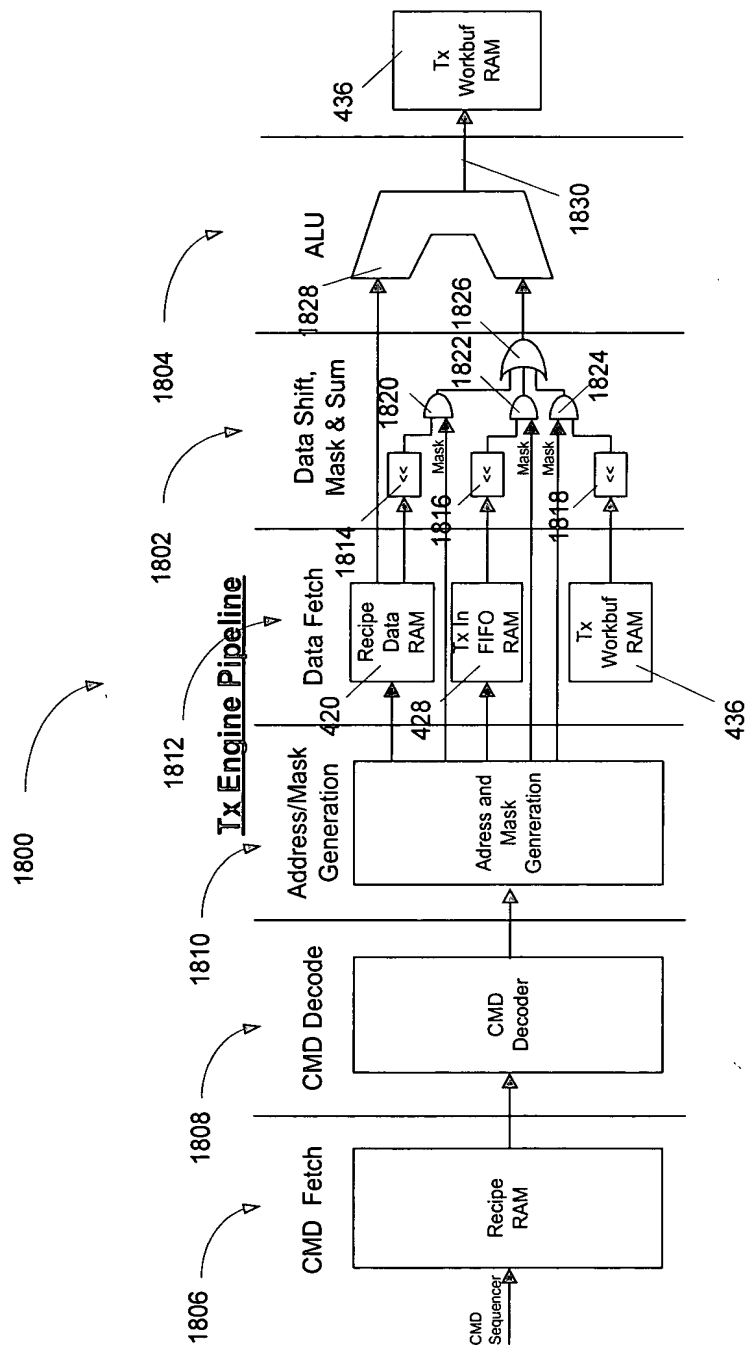


FIGURE 18

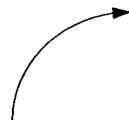
1900



10.4.1.1. External Link Entry Format

Bit	Function	Description
17-0	BURST ADDR 0	Burst Address 0.
21-18	BURST LEN 0	Burst Length 0.
41-22	BURST ADDR 1	Burst Address 1.
45-42	BURST LEN 1	Burst Length 1.
65-46	BURST ADDR 2	Burst Address 2.
69-66	BURST LEN 2	Burst Length 2.
70	INT/EXT	Internal/External.
71	PAK	Parity Bit. Set so that there is odd parity across bits 7:0 of the entry data.

FIGURE 19

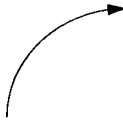


10.4.1.2. Internal Link Entry Format

Bit	Function	Description
20-0	BURST ADDR 1	Burst Address 1.
25-21	BURST LEN 1	Burst Length 1.
46-26	BURST ADDR 2	Burst Address 2.
51-47	BURST LEN 2	Burst Length 2.
62-52	INT RECIPE INDEX	Internal Recipe Index.
67-63	INT RECIPE LEN	Internal Recipe Length.
69-68	-	Reserved
70	INT EXT	Internal/External.
71	PAR	Parity Bit. Set so that there is odd parity across bits 71:0 of the entry data.

FIGURE 20

2100



10.4.1.4. Data Entry Format

Bit	Function	Description
31-0	DATA 0	Data Segment 0.
35-32	DATA LEN	Data Length.
63-36	DATA 1	Data Segment 1.
70-68	-	Reserved.
71	PAR	Parity Bit. Set so that there is odd parity across bits 71-0 of the entry data.

FIGURE 21A

PXIM Data Mask Format Inside the external PXIM RAM									
PartID[7]	Reserved[70:68]	Mask2[67:60]	Data2[59:44]	Data1[43:36]	Length[30]	Mask0[31:16]	Data0[15:0]		
PartID[7]	Reserved[70:68]		Unused[67:36]		Length[30]	Unused[31:8]	Mask2[7:0]		

FIGURE 21B

Internal Recipe RAM Data Format				
[7:1]	[70]	[89:36]	[95:34]	[93:0]
Pairing	Command (n+1) valid	Command (n+1)	Reserved	Command (n)

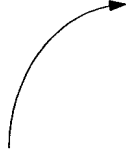
FIGURE 22

2300 

TXM Command Format									
[33:29]	[28]	[27:25]		[24:18]		[17]	[16:14]	[13:7]	[6]
Opcode	Page	Can2		Offset2		Page	Can1	Offset1	Ins/Reg CMD Length
			Source Address				Destination Address		

FIGURE 23

2400



Context	Context Name	Location
C0	NULL	The very first byte of the packet including AFH
C1	L2	The start of the MAC header
C2	Ethertype	The start of the Ether type field (if present)
C3	MPLS	The start of the MPLS header(s) (if present)
C4	L3 Outer	The start of the outer L3 header
C5	L3 Inner	The start of the inner L3 header
C6	L4	The start of the TCP/UDP/? Header

FIGURE 24

Opcode	Command Macro/mnemonic	Control Information	Data Fields
00000	TXM_CMD_NOP	.	.
00001	TXM_CMD_INSERT	Offset, Length	Insertion Data
00010	TXM_CMD_DELETE	Offset, Length	.
00011	TXM_CMD_REPLACE	Offset, Length	Replacement Data
00100	TXM_CMD_REPLACE_MASK	Offset, Length	Replacement Data/Mask
00101	TXM_CMD_COPY	Offset Source, Offset	.
00110	TXM_CMD_COPY_MASK	Destination, Length	Copy Mask
00111	TXM_CMD_COPY_INS	Offset Source, Offset	.
01000	TXM_CMD_COPY_INS_MASK	Offset Destination, Length	Copy Mask
01001	TXM_CMD_MACRO1	Offset Source, Offset Destination, Length	MAC DA, MAC SA
01010	TXM_CMD_MACRO2	VDEL, MICAST flags, MAC DA, MAC SA, VLAN	MAC DA, MAC SA
01011	RESERVED	.	.
01100	TXM_CMD_ACL	Index, VPORT	.
01101	TXM_CMD_EMC_VPRI	VPR1-EXP EMC fields	.
01111	TXM_CMD_EMC_IPTOS	IPTOS EMC fields	.
10000	TXM_CMD_INCREMENT_INSERT	Offset, Length	.
10001	TXM_CMD_INCREMENT_REPLACE	Offset, Length	.
10010	TXM_CMD_DECREMENT	Offset, Length	ALU Data
10011	TXM_CMD_AND	Offset, Length	ALU Data
10100	TXM_CMD_OR	Offset, Length	ALU Data
10101	TXM_CMD_XOR	Offset, Length	ALU Data
10110	TXM_CMD_ADD	Offset, Length	ALU Data
10111	TXM_CMD_SUB	Offset, Length	ALU Data
11000	TXM_TTL_DECREMENT	MC-AST/BG-AST flags	TTL, decrement limit registers
11001	TXM_TC_INCREMENT	.	TC limit register
11010	TXM_TTL_DECREMENT_INS	MC-AST/BG-AST flags	TTL, decrement limit registers
11011	TXM_TC_INCREMENT_INS	.	TC limit register
11100	Reserved	.	.
11111		.	.

FIGURE 25

	txmi_cmd_replace_da	(Context: L2, Offset: 0, Length 6)
	txmi_cmd_data	MAC DA (6 bytes external)
OPT1:	txmi_cmd_replace	(Context: L2, Offset: 6, Length 6)
	txmi_data	MAC SA (6 bytes external)
OPT2:	txmi_cmd_replace_sa	(Context: L2, Offset: 6, Length 6)
	txmi_data	Internal SA Pointer
OPT3:	txmi_cmd_vlan_delete_replace	(Context: L2, Offset: 14, Length 2)
	txmi_data	VLAN (2 bytes external)

- OPT1: If configuration register flag (use_internal_mac_sa) is set to 0 then the MAC SA will be read from the external TXM RAM.
- OPT2: If configuration register flag (use_internal_mac_sa) is set to 1 then the MAC SA data will come from the internal register in the source field of the command (0 – 15).
- OPT3: If the VDEL flag is set to 1 the VLAN field will be deleted else the VLAN field will be replaced with external TXM data.

FIGURE 26

txmi_cmd_replace_da	(Context: L2, Offset: 0, Length 6)
txmi_cmd_data	MAC DA (6 bytes external)
OPT1: txmi_cmd_replace	(Context: L2, Offset: 6, Length 6)
txmi_data	MAC SA (6 bytes external)
OPT2: txmi_cmd_replace_sa	(Context: L2, Offset: 6, Length 6)
txmi_data	Internal SA Pointer
OPT3: txmi_cmd_vlan_delete	(Context: L2, Offset: 14, Length 2)
OPT1: If configuration register flag (use_internal_mac_sa) is set to 0 then the MAC SA will be read from the external TXM RAM.	
OPT2: If configuration register flag (use_internal_mac_sa) is set to 1 then the MAC SA data will come from the internal register in the source field of the command (0 - 15).	
OPT3: If the VDEL flag is set to 1 the VLAN field will be deleted else the txmi_cmd_vlan_delete command will be converted to a txmi_cmd_nop command.	

FIGURE 27

```

if broadcast IP packets
  if (TTL>IPbroadcast_TTL_Limit(sub_channel))
    Decrement TTL
    continue with next operation
  else
    Drop the packet
else if multicast IP packets
  if (TTL>IPmulticast_TTL_Limit(sub_channel))
    Decrement TTL
    continue with next operation
  else
    Drop the packet
else // Must be unicast IP packets
  if (TTL>IPunicast_TTL_Limit(sub_channel))
    Decrement TTL
    continue with next operation
  else
    Drop the packet

```

FIGURE 28

```
if (TC<TC_Limit(sub_channel))  
    increment TTL  
    continue with next operation  
else  
    Drop the packet
```

FIGURE 29

12M Command Format for the 1xACL block				
[33:29]	[28:20]	[19:4]	[30]	
Opcode	Reserved	VPORT		Index

FIGURE 30

TXM Command Format for the TX Post Processor block		
[33:29]	[28:0]	[7:0]
Opcode	VPRI-EXP / IPTOS EMC Command	Reserved

FIGURE 31

Error Flag	Error Description	Action
0	ALU & Copy commands > packet size	Flag packet to be killed
1	Destination address is ahead of current read pointer	Flag packet to be killed
2	ALU & Copy commands > packet size	Flag packet to be killed
3	Reserved Opcode detected in the pipeline	Flag packet to be killed
4	Context1 < Context0	Flag packet to be killed
6	Context2 < Context1	Flag packet to be killed
7	Context3 < Context2	Flag packet to be killed
8	Context4 < Context3	Flag Packet to be killed
9	Context5 < Context4	Flag packet to be killed
10	Context6 < Context5	Flag packet to be killed
11	TTL < limit or TC > limit	Flag packet to be killed
12	TXM IN DATA RAM Parity Error	Flag packet to be killed
13	TX Workbuf Parity Error	Flag packet to be killed
14	TRAM or Internal Recipe RAM Parity Error	Flag packet to be killed
15	Packet modification > 0x80	Flag packet to be killed

FIGURE 32

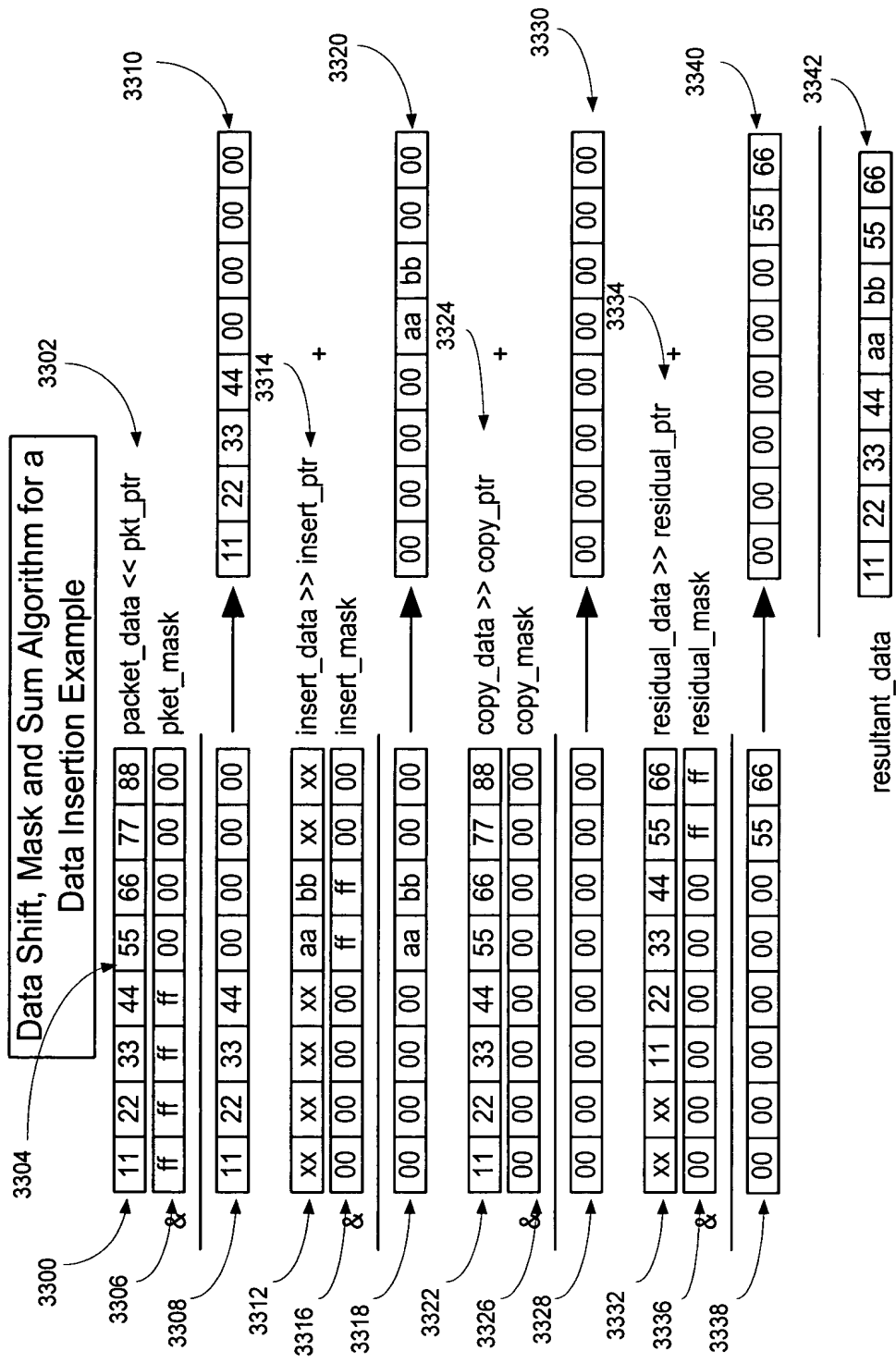


FIGURE 33

Sample Transmit Modification Recipe for a MAC Header Operation

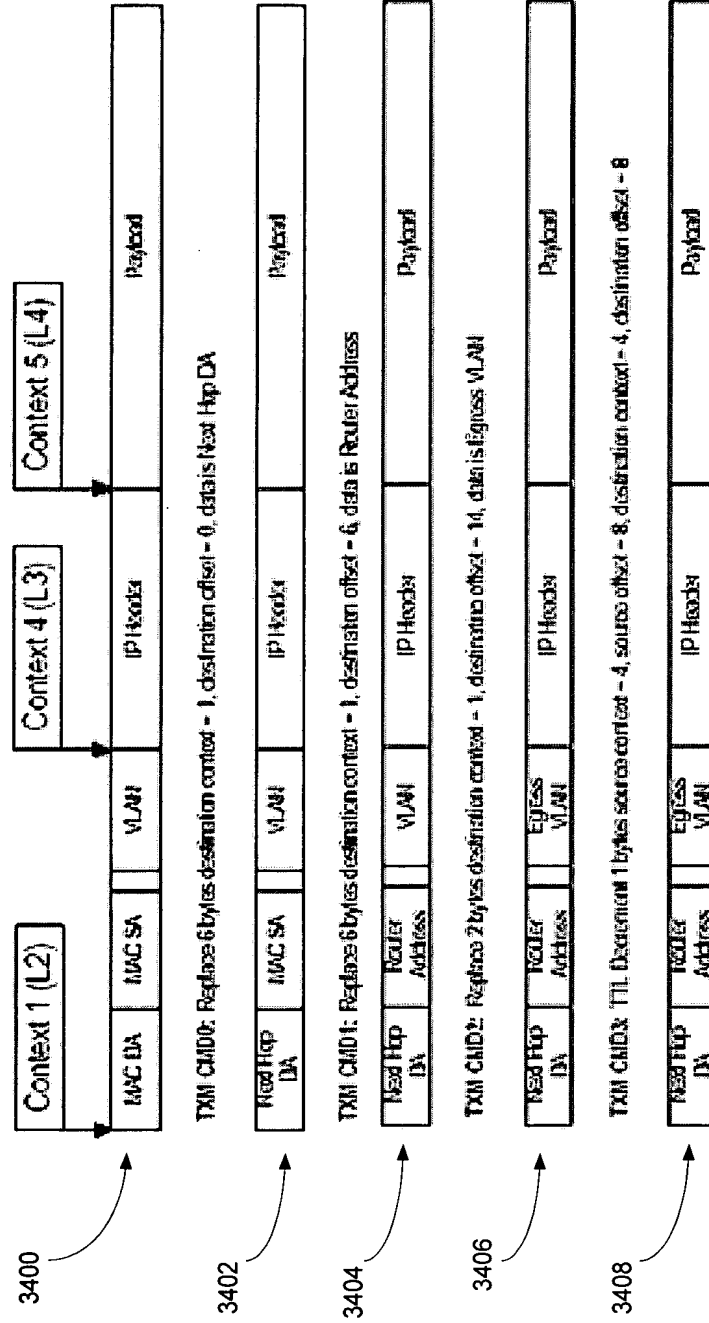


FIGURE 34

Forwarding Process Operation	Modification Type	Size (Bytes)	Packet Offset(s)
Next Hop MAC DA Replacement	Replace	6	0 (MAC)
Next Hop VLAN ID Replacement	Masked Replace	2	12 (MAC)
Source Address Insertion	Replace	6	6 (MAC)
TTL Decrement IPv4	Decrement	1	8 (NETWORK)
MPLS Stack Single Entry Add/Delete	Insert / Delete	4	0 (MPLS)
MPLS Stack Double Entry Add/Delete	Insert / Delete	8	0 (MPLS)
MPLS Label Change	Replace (could be masked to preserve CoS bits)	4	0 (MPLS)
MPLS TTL Decrement	Decrement	1	3 (MPLS)
MPLS TTL Copy	Copy	1	3 (MPLS) 10 8 (NETWORK)
MPLS EtherType Replace/Restore	Replace	2	0 (LLC)
IP v4 Encapsulate/De-Encapsulate	Insert / Delete	20	0 (NETWORK)

FIGURE 35

CMD Function	CMD #	TXM CMD MNEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
		TXM_CMD_DATA	--	--	--	--	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	--	--	6
Replace VLAN ID TTL	3	TXM_CMD_REPLACE	--	--	L2	14 (no DID)	2
		TXM_CMD_DATA	--	--	--	--	2
Decrement IPv4	4	TXM_CMD_DECREMENT	L3	8	L3	8	1

FIGURE 36

CMD Function	CMD #	TXM CMD MNEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
		TXM_CMD_DATA	--	--	--	--	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	--	--	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	14	2
		TXM_CMD_DATA	--	--	--	--	2
Ipv4 Encap	4	TXM_CMD_INSERT	--	--	L3 Outer	0	7
		TXM_CMD_DATA	--	--	--	--	7
TTL Decrement	5	TXM_CMD_DECREMENT	L3 Outer	8	L3 Outer	0	1
		INSERT	--	--	--	--	--
IPv4 Encap	6	TXM_CMD_INSERT	--	--	L3 Outer	0	8
		TXM_CMD_DATA	--	--	--	--	8
IPv4 Encap	7	TXM_CMD_INSERT	--	--	L3 Outer	0	4
		TXM_CMD_DATA	--	--	--	--	4

FIGURE 37

CMD Function	CMD #	TXM CMD MNEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	-	--	L2	0	6
		TXM_CMD_DATA	-	--	--	-	6
Replace MAC SA	2	TXM_CMD_REPLACE	-	--	L2	6	6
		TXM_CMD_DATA	-	--	--	-	6
Replace VLAN ID	3	TXM_CMD_REPLACE	-	--	L2	14 (no DID)	2
		TXM_CMD_DATA	-	--	--	-	2
IPV4 de- encapsulate	4	TXM_CMD_DELETE	-	--	L3 Outer	0	0
Decrement Inner TTL	5	TXM_TTL_DECREMENT	L3 Inner	8	L3 Inner	8	1

FIGURE 38

CMD Function	CMD #	TXM CMD MINEUNIONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
		TXM_CMD_DATA	--	--	--	--	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	--	--	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	14	2
		TXM_CMD_DATA	--	--	--	--	2
Ipv6 Encap	4	TXM_CMD_INSERT	--	--	L3 Outer	0	7
		TXM_CMD_DATA	--	--	--	--	7
TTL Decrement	5	TXM_CMD_DECREMENT INSERT	L3 Outer	8	L3 Outer	0	1
Ipv6 Encap	6	TXM_CMD_INSERT	--	--	L3 Outer	0	8
		TXM_CMD_DATA	--	--	--	--	8
Ipv6 Encap	7	TXM_CMD_INSERT	--	--	L3 Outer	0	8
		TXM_CMD_DATA	--	--	--	--	8
Ipv6 Encap	8	TXM_CMD_INSERT	--	--	L3 Outer	0	8
		TXM_CMD_DATA	--	--	--	--	8
Ipv6 Encap	9	TXM_CMD_INSERT	--	--	L3 Outer	0	8
		TXM_CMD_DATA	--	--	--	--	8

FIGURE 39

CMD Function	CMD #	TXM CMD MNEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
		TXM_CMD_DATA	--	--	--	--	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	--	--	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	14	2
		TXM_CMD_DATA	--	--	--	--	2
Ipv6 Encap	4	TXM_CMD_INSERT	--	--	L3 Outer	0	7
		TXM_CMD_DATA	--	--	--	--	7
TTL Decrement	5	TXM_CMD_DECREMENT	L3 Outer	8	L3 Outer	0	1
		INSERT	--	--	--	--	--
IPv6 Encap	6	TXM_CMD_INSERT	--	--	L3 Outer	0	8
		TXM_CMD_DATA	--	--	--	--	8
Ipv6 Encap	7	TXM_CMD_INSERT	--	--	L3 Outer	0	8
		TXM_CMD_DATA	--	--	--	--	8
Ipv6 Encap	8	TXM_CMD_INSERT	--	--	L3 Outer	0	8
		TXM_CMD_DATA	--	--	--	--	8
IPv6 Encap	9	TXM_CMD_INSERT	--	--	L3 Outer	0	8
		TXM_CMD_DATA	--	--	--	--	8

FIGURE 40

CMD Function	CMD #	TXMI CMD MNEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Last Hop Route Address	1	TXMI_CMD_COPY	L3	10	L2	0	6
Replace MAC SA	2	TXMI_CMD_REPLACE	--	--	L2	6	6
		TXMI_CMD_DATA	--	--	-	-	6
Replace VLAN ID	3	TXMI_CMD_REPLACE	--	--	L2	14	2
		TXMI_CMD_DATA	--	--	-	-	2
Increment TC	4	TXMI_CMD_INCREMENT	L3	5	L3	5	1

FIGURE 41

CMD Function	CMD #	TXM CMD NINEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
		TXM_CMD_DATA	--	--	-	-	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	-	-	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	14	2
		TXM_CMD_DATA	--	--	-	-	2
Replace EtherType	4	TXM_CMD_REPLACE	--	--	Ether	0	2
MPLS Label Insert	5	TXM_CMD_INSERT	--	--	MPLS	0	3
		TXM_CMD_DATA	--	--	-	-	3
TTL Decrement	6	TXM_CMD_DECREMENT	L3	8	MPLS	3	1

FIGURE 42

CMD Function	CMD #	TXM CMD MNEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
		TXM_CMD_DATA	--	--	-	-	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	-	-	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	14	2
		TXM_CMD_DATA	--	--	-	-	2
Replace EtherType	4	TXM_CMD_REPLACE	--	--	Ether	0	2
MPLS Label Insert	5	TXM_CMD_INSERT	--	--	MPLS	0	3
		TXM_CMD_DATA	--	--	-	-	3
TTL Decrement	6	TXM_CMD_DECREMENT	L3	8	MPLS	3	1
MPLS Label Insert	7	TXM_CMD_INSERT	--	--	MPLS	4	3
TTL Decrement	8	TXM_CMD_DECREMENT	L3	8	MPLS	7	1

FIGURE 43

CMD Function	CMD #	TXM CMD MNEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
		TXM_CMD_DATA	--	--	--	--	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	--	--	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	14	2
		TXM_CMD_DATA	--	--	--	--	2
MPLS Label Insert	4	TXM_CMD_INSERT	--	--	MPLS	0	3
		TXM_CMD_DATA	--	--	--	--	3
TTL Decrement	5	TXM_CMD_DECREMENT	L3	8	MPLS	3	1

FIGURE 44

CMD Function	CMD #	TXM CMD MNEUMONIC	Source Context	Source Offset	Destination Context	Destination Offset	Length
Replace MAC DA	1	TXM_CMD_REPLACE	--	--	L2	0	6
		TXM_CMD_DATA	--	--	-	-	6
Replace MAC SA	2	TXM_CMD_REPLACE	--	--	L2	6	6
		TXM_CMD_DATA	--	--	-	-	6
Replace VLAN ID	3	TXM_CMD_REPLACE	--	--	L2	14	2
		TXM_CMD_DATA	--	--	-	-	2
TTL Decrement	4	TXM_CMD_DECREMENT	L3	8	L3	8	1
Replace IP DA or SA	5	TXM_CMD_REPLACE	L3	12/16	L3	12/16	4
		TXM_CMD_DATA	--	--	-	-	4
Replace TCP/UDP Source or Dest port	5	TXM_CMD_REPLACE	L4	0/2	L4	0/2	2
		TXM_CMD_DATA	--	--	-	-	2

FIGURE 45

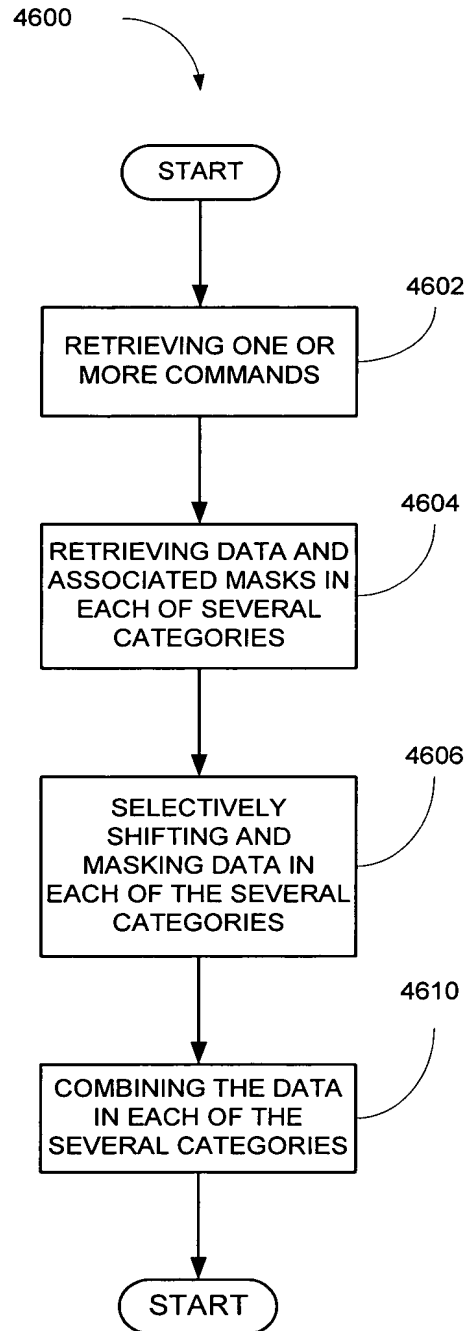


FIGURE 46

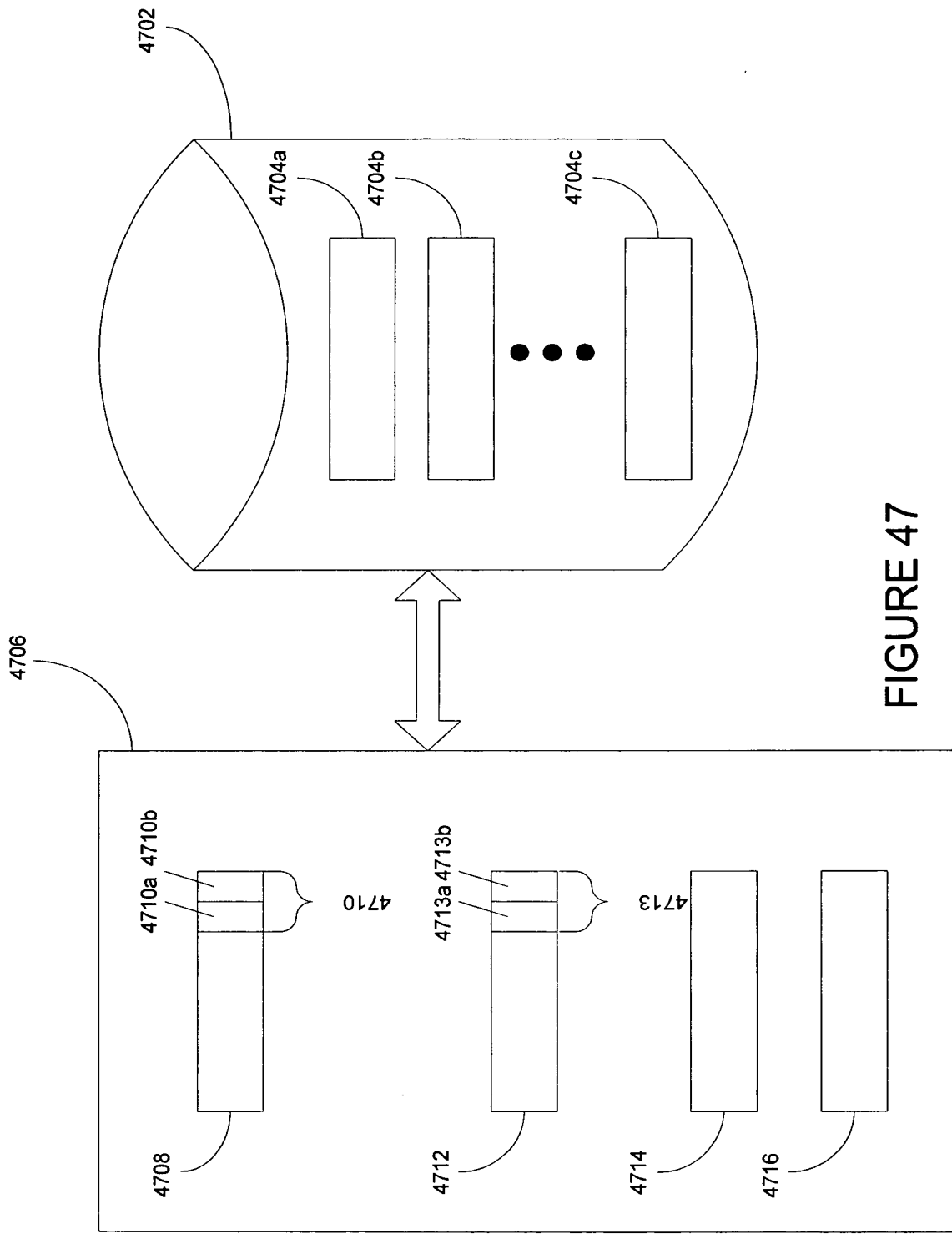


FIGURE 47

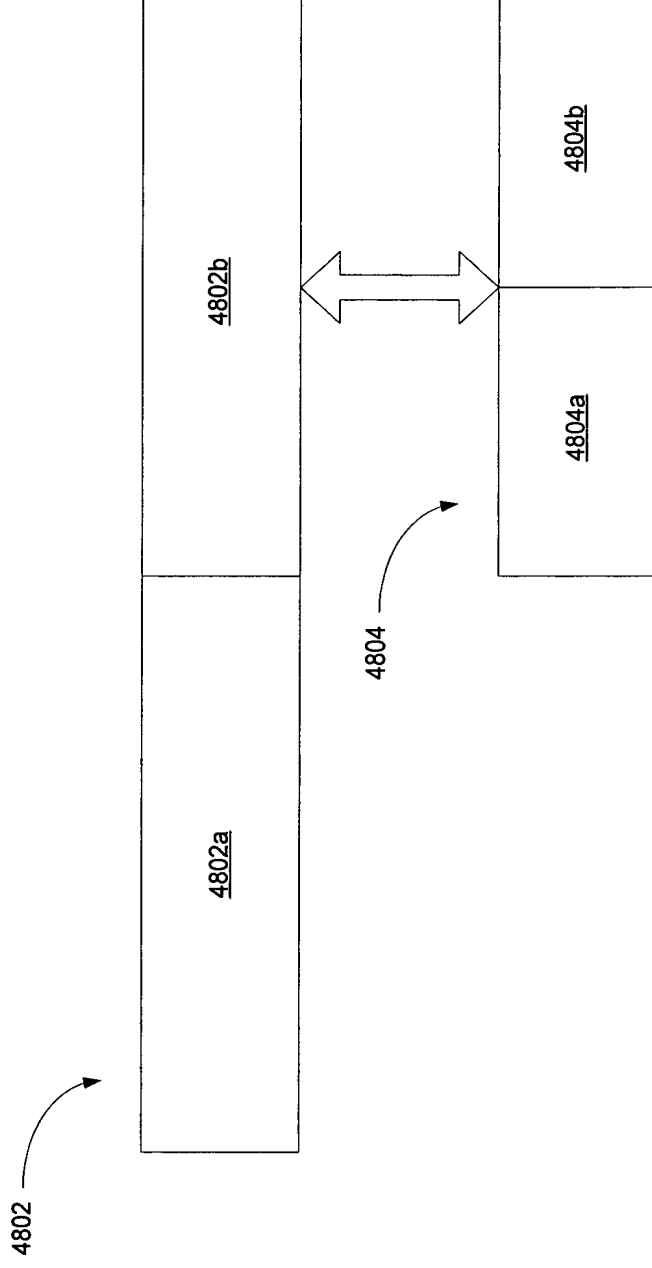


FIGURE 48

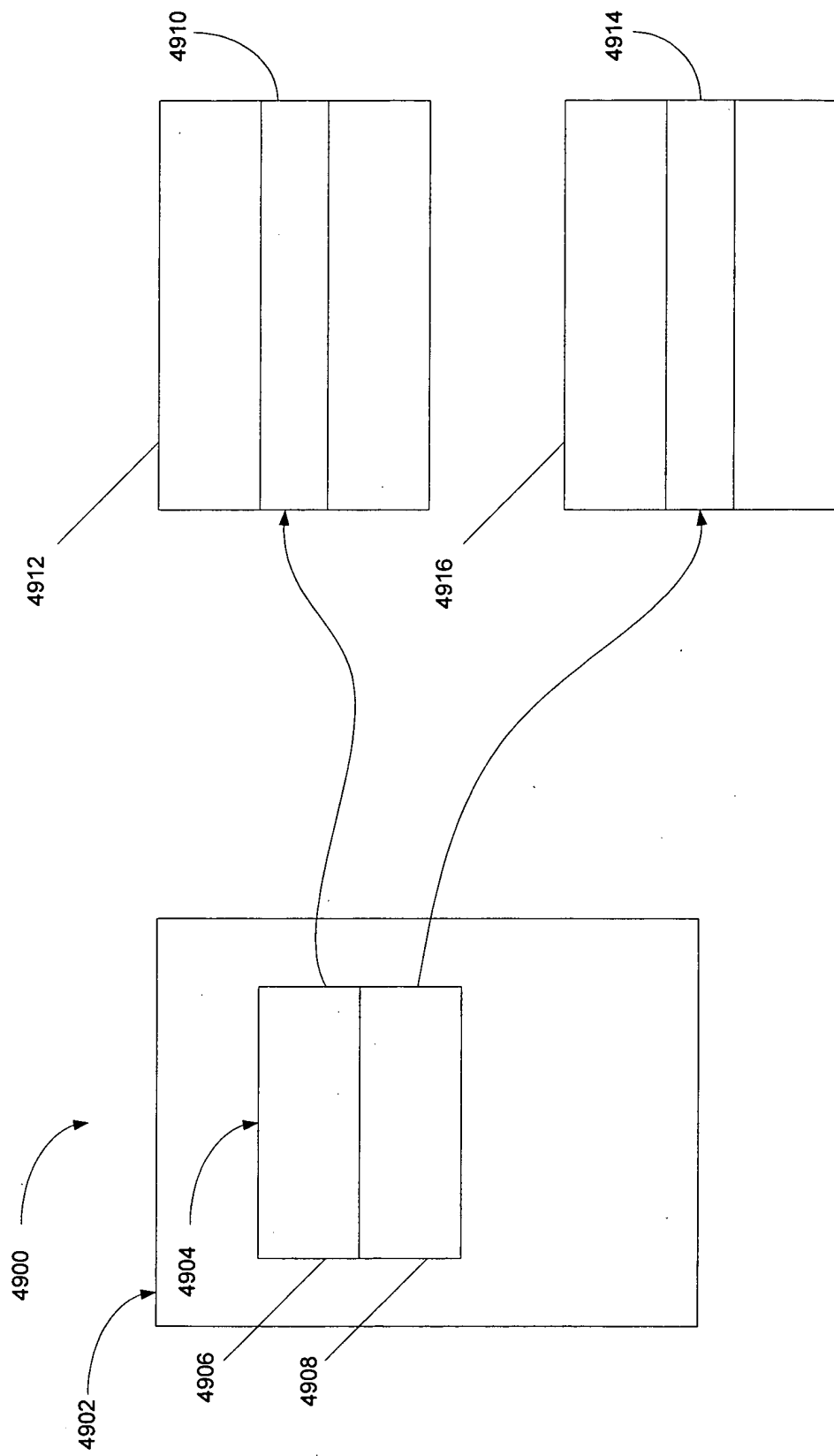


FIGURE 49

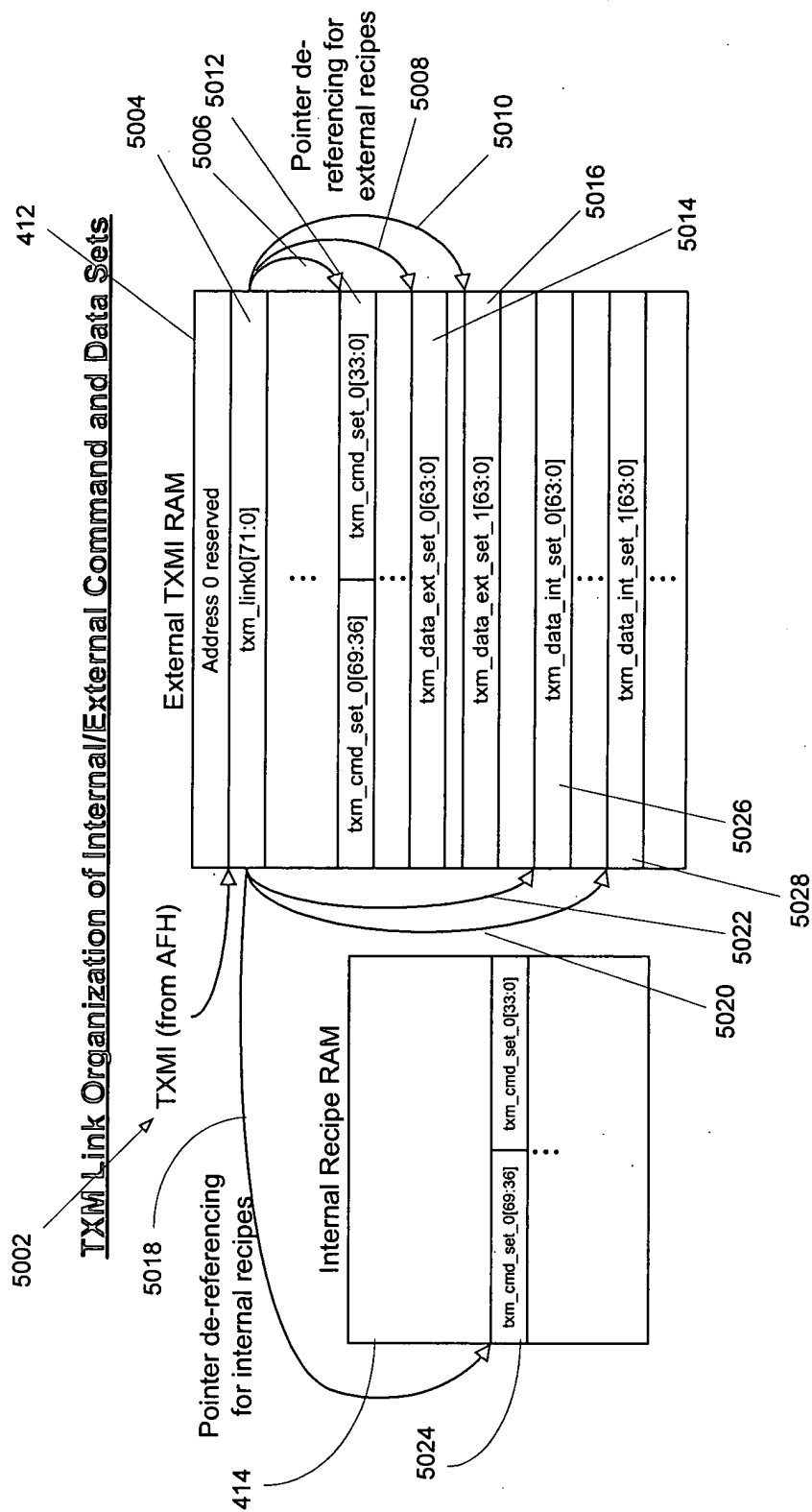


FIGURE 50

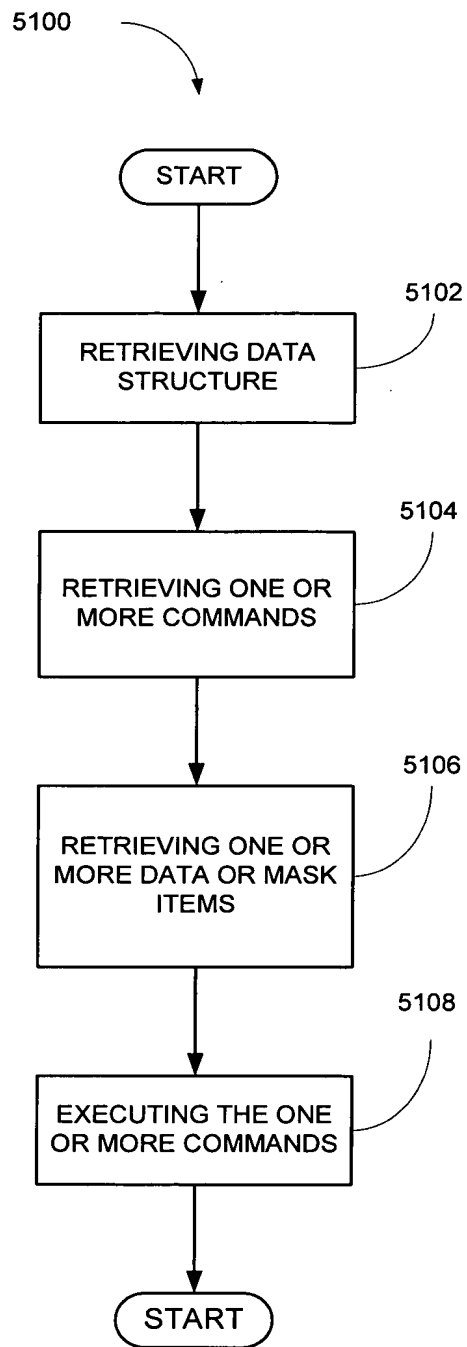


FIGURE 51

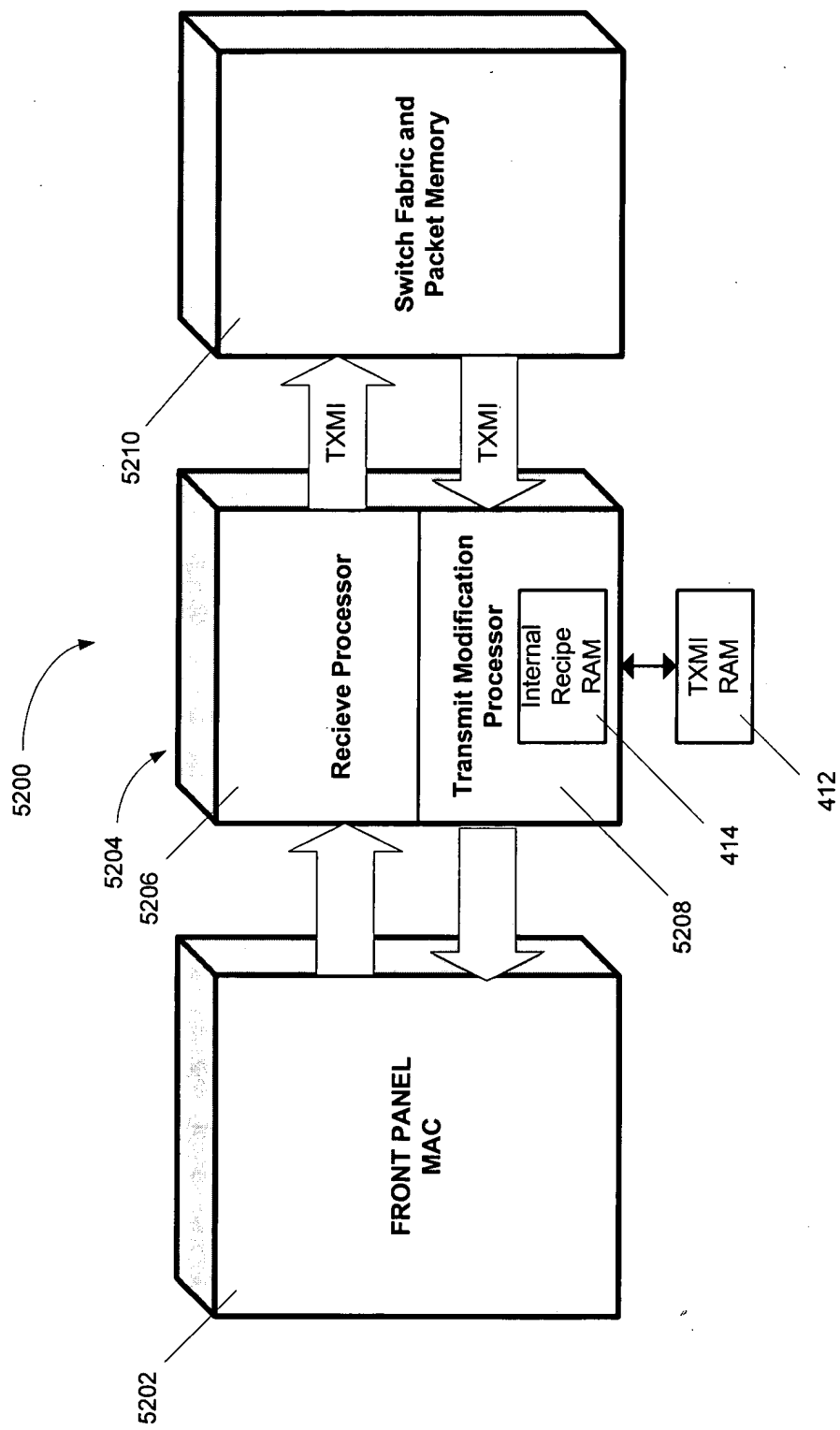


FIGURE 52